APPENDIX C INSTRUCTIONS FOR LABELS AND DECALS

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C.1   INTRODUCTION

The ISS Payload Label Approval Team (IPLAT) reviews and approves labels for all payload equipment that the crew will interface with during nominal operations, planned maintenance, and contingency operations. IPLAT does not approve Operations Nomenclature, procedures or displays. The Payload Operations Data File (PODF) group reviews and approves Operations Nomenclature and procedures. The Payload Display Review Panel (PDRP) reviews and approves all software displays. IPLAT, PODF and PDRP consult with one another regarding label issues that have implications for procedures and displays.

Appendix C provides the instructions for the approval of payload labels. The development of labels will be a joint process requiring the cooperative efforts of the IPLAT and the PD. The process for developing labels, from the beginning to the delivery of flight certified labels which have been approved by IPLAT, is documented in Figure C.1–1.

To understand the priorities of the instructions, the following definitions need to be applied throughout Appendix C.

Statements with "must" will be used for instructions which are required to be met for IPLAT to provide approval.

Statements with "should" will be used for instructions which are incorporated into the label unless adequate justification is provided to IPLAT to warrant exempting the label instruction.

The term "label" used throughout these instructions refers to any one of the following:
- Silk-screened labels: Markings that are silk-screened, with ink, onto hardware.
- Decals: Peel-off labels with adhesive backing that are applied onto hardware.
- Ink-stamped labels: Markings, stamped with ink, onto the hardware.
- Engraved or Etched labels: Markings carved onto the hardware surface.
- Placards: Cards which are inserted into pockets.
- Any other method of applying markings onto hardware.

SSP 50005, International Space Station Flight Crew Integration Standard (NASA–STD–3000/T) was used as the basis for the payload labeling guidelines contained herein.

C.2   ISS PAYLOAD LABEL APPROVAL PROCESS

The PD is responsible for providing label drawings, label location drawings and information sufficient to enable IPLAT to determine that the instructions herein are met. The PD will coordinate with IPLAT before submitting the label drawings for approval.
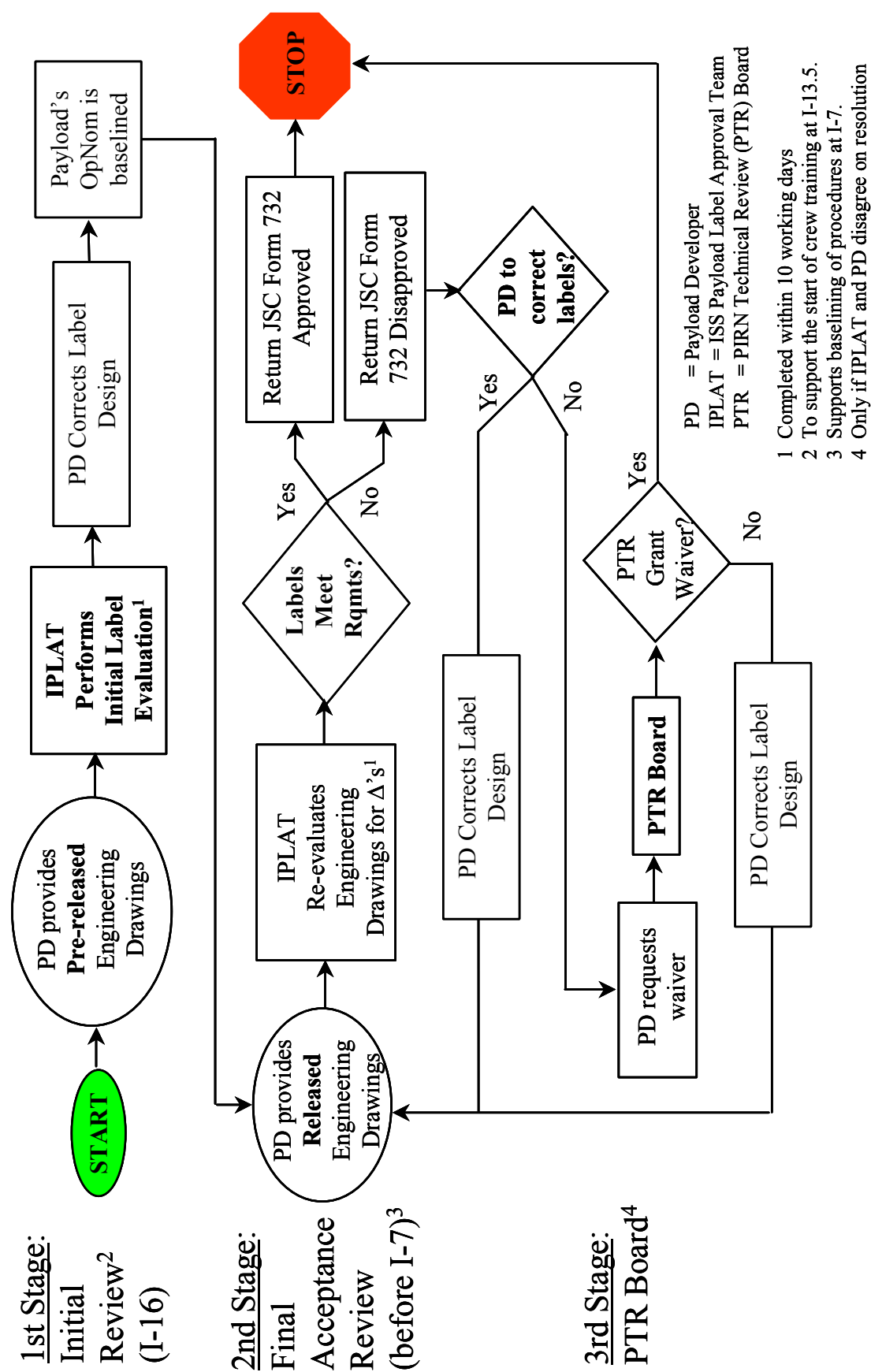
IPLAT is responsible for reviewing all payloads labels, providing guidance to the PD and granting approval based on the instructions herein. IPLAT is also responsible for performing a human engineering assessment of the labels and ensuring the labels are appropriate from a human engineering perspective, including commonality, standardization, and terminology.

The process for obtaining approval of ISS payload labels is shown in Figure C.1-1. IPLAT performs two evaluations. The initial label evaluation is performed at approximately the I-16 timeframe. This supports the start of crew training at I-13.5. The PD submits pre-released engineering drawings to IPLAT. Less formal materials are acceptable for this first review if they contain enough information for IPLAT to perform the evaluation. Upon receiving the drawings, or other materials, IPLAT has 10 working days to complete the evaluation. IPLAT will return a checklist that documents any requirement violations, and suggested solutions. The PD will then update the label designs based on IPLAT's recommendations.

The final label evaluation is to be completed before I-7, enabling the payload to meet the I-7 deadline for final procedures review and baselining; followed by shipping of flight hardware to KSC by L-6. Before this final evaluation, the payload's Operations Nomenclature (OpNom), must be baselined. The PD submits released engineering drawings to IPLAT. IPLAT has 10 working days to complete this final evaluation. If the labels meet the requirements, IPLAT returns JSC Form 732, approved, to the PD. Form 732 is the PD's official verification that the labels meet the requirements, and should be included in the payload's verification record. If the labels still do not meet the requirements, the PD will correct the label design per IPLAT's recommendations.

The PTR is responsible for resolving issues and disagreements between the PD and IPLAT.

Once final approval has been granted via Form 732, the PD can manufacture labels, or order labels from the Decal Design & Production Facility (DDPF) via JSC Form 733.

FIGURE C.1-1 IPLAT PAYLOAD LABEL APPROVAL PROCESS

1st Stage: Initial Review[2] (I-16)

START

PD provides **Pre-released** Engineering Drawings

IPLAT Performs Initial Label Evaluation[1]

PD Corrects Label Design

Payload's OpNom is baselined

2nd Stage: Final Acceptance Review (before I-7)[3]

PD provides **Released** Engineering Drawings

IPLAT Re-evaluates Engineering Drawings for Δ's[1]

Labels Meet Rqmts?

Yes → Return JSC Form 732 Approved → STOP

No → Return JSC Form 732 Disapproved → **PD to correct labels?**

Yes → PD Corrects Label Design

No →

3rd Stage: PTR Board[4]

PD requests waiver

PTR Board

PTR Grant Waiver?

Yes

No → PD Corrects Label Design

PD = Payload Developer
IPLAT = ISS Payload Label Approval Team
PTR = PIRN Technical Review (PTR) Board

1 Completed within 10 working days
2 To support the start of crew training at I-13.5.
3 Supports baselining of procedures at I-7.
4 Only if IPLAT and PD disagree on resolution

4

C.3   IPLAT APPROVAL INSTRUCTIONS

IPLAT will use the following instructions in reviewing and providing the approval of payload labels.

C.3.1 GROUND ASSEMBLY AND HANDLING

Labels used for ground assembly and handling must not interfere with on-orbit crew interface labeling. Product marking for ground assembly and handling should be in accordance with MIL–STD–130, section 4, except paragraph 4.1.c.

C.3.2 FUNCTION CONSIDERATIONS

A. Decals and placards must contain information required by the user regarding the purpose, the function, and/or the functional result of the use of equipment items. Engineering characteristics or nomenclature may be described as a secondary consideration.

B. Instrument decals and placards, for example, should be labeled in terms of what is being measured or controlled. Calibration data may be included where applicable

C.3.3 PAYLOAD ORIENTATION

A. Payload labeling, displays, and controls must have a consistent rack vertical orientation arrangement with the rack vertical axis origin at the bottom of the rack hinge point.

B. Payload labels required for operations with the rack(s) rotated should be oriented with respect to required crew positions.

C.3.4   DELETED (MOVED TO C.3.5.4.1)

C.3.5 LABELING DESIGN

C.3.5.1 LABELING STANDARDIZATION

A. Standard decals needed by the PD which are available in JSC 27260, Decal Process Document and Catalog, must either be obtained from the Decal Design & Production Facility (DDPF), or designed to be identical to them. Examples of labels found in the catalog are: IMS, fire hole, toxicology, hazardous, caution and warning, rack power switch, fire indicators, cable/hose labels, etc. The DDPF is also available to PDs for fabricating labels not found in JSC 27260.

B. Labeling must be standardized between and within systems.

C. Deleted.

D. Operations Nomenclature (OpNom)

(1) Non-IMS Hardware Labels - Nomenclature on all non-IMS hardware labels must conform to the operational nomenclature guidelines for content (characters used) provided in SSP 50254, Operations Nomenclature. The format for these labels is upper case, as required in paragraph E below.

(2) IMS Labels - When nomenclature is used above the bar code of an IMS label:

a) Such nomenclature must conform to SSP 50254 guidelines for both content and format (mixed case).

b) Such nomenclature must match the nomenclature on the hardware label, except that IMS label text is in mixed case, and hardware label text is in upper case.

E. Label Text

(1) Upper Case – Labels for equipment, displays, controls, switch positions, connectors, cables/hoses, LEDs, stowage containers, etc., must be listed in upper case letters only. This includes abbreviations and acronyms.

(2) Payload Name labels

a)   Spelling Out vs. Acronyms - The name label for the "main unit" of a payload must spell out the name, followed by the acronym in parentheses, even if the acronym is an approved OpNom. The OpNom acronyms may then be used on all subordinate equipment. For example: The rack for SRF should spell out "SCIENCE RESEARCH FACILITY (SRF)". All subordinate equipment may then use the SRF acronym, like "SRF ANALYZER MODULE".

b)   Font size for name labels – The font size for the name label of an item should not be less than 12 point.

(3) Title nomenclature must be consistent with procedural handbooks and checklists.

F. General To Specific Principle – More general, or important information should be placed above or to the left on a label(s). Increasingly more specific, or less important information should be placed lower or to the right, with the most specific, least important information on the bottom or furthest right.

G. Keypads – Non–COTS keypads on payloads should use mixed case (upper and lower case) letters.

C.3.5.2   READABILITY

A. Decals and placards should be as concise and direct as possible.

B. Abbreviations

(1) Deleted

(2) Periods should be omitted except when needed to preclude misinterpretation.

C. Decal and Placard Life

Payloads must provide labels that are readable for the duration of the payload's operation, which are replaceable.

D. Language

(1) Decals and placards must be written in the English language.

(2) If dual languages are used, English must be used first and with lettering at least 25% larger than the secondary language.

E.   Decals and placards should be designed so as to minimize visual clutter.

F.   Illumination – Labels and markings should be designed to be read at all general illumination levels and color characteristics of the illuminant as specified in Table 3.12.3.4–2.

G.   Displays and Controls Title Selection

(1) Physical Hardware – When verbs are used to label physical hardware (buttons, switches, controls, etc.), the present tense should be used. For example: OPEN or CLOSE, BEGIN, or END, START or STOP, etc.

(2) Physical Hardware Linked to Software Displays – If physical hardware is linked to and/or represented by software displayed data or controls (i.e. LCD), the labels for the physical hardware and the software representation must use the same terminology.

C.3.5.3   LABEL PLACEMENT

A. All labels must be placed on the payload hardware in accordance to the label location drawings.

B. Payloads Operated From Rack Front Panels – Payloads operated from the front panel of racks must be labeled in accordance to Figure C.3.5.3-1.

    (1) Rack IMS Label - The rack IMS label must be located on the top left corner of the rack.

    (2) Rack Name Label

        a) The rack name label must be located to the right of the rack IMS label.

        b) The rack name label must spell out the name of the rack. The acronym, if applicable, should follow in parentheses. The acronym may then be used on all subordinate equipment.

        c) The font size of the rack name label should be the largest one for the entire rack, at 48 point font, minimum.

    (3) Subrack IMS Label - The subrack IMS label must be located on the top left corner of the subrack drawer.

    (4) Subrack Name Label

        a) The subrack name label must be located to the right of the subrack IMS label.

        b) The subrack name label must spell out the name of the subrack. The acronym, if applicable, should follow in parentheses. The acronym may then be used on all subordinate equipment.

            1) If this subrack is part of a facility rack (i.e. HRF, MSG, FCF, etc.), and will never be relocated into another rack, then the subrack name label need not include the facility's acronym (e.g. "WORKSTATION", as opposed to "HRF WORKSTATION").

            2) If there are several related subracks that are considered a "sub-facility", the first such subrack must spell out the name of the sub-facility. The remaining subracks may use the acronym if they are co-located and below this subrack. For example, in Figure C.3.5.3-1, MICROBIOLOGY FACILITY is the name of the sub-facility, and is spelled out on the first subrack (in location B2), with the acronym

following in parentheses. The remaining subracks only use the acronym.

    c) The font size of the subrack name label should be smaller than the rack name label, between 28 and 36 point.

C. Payloads Not Operated From Rack Front Panels – This section applies to all self–contained payloads other than those controlled from front panels (mounted elsewhere, not on the face of a rack like subrack payloads). Examples: SAMS II Remote Triaxial Sensor System, HRF Phantom Torso and DOSMAP, etc.   See Figure C.3.5.3–3.

(1) The IMS label should be placed in the upper left corner of the dominant face of the payload.

(2) Payload Name Label

    a) The payload name label should be placed to the right of the IMS label.

    b) The payload name label must spell out the name of the payload if it is considered the "main unit". The acronym, if applicable, should follow in parentheses. The acronym may then be used on all subordinate equipment.

    c) The font size of the payload name label should be the largest one for the entire payload.

D. Loose Equipment

1) The IMS label should be placed in the upper left corner (if there is one) of the dominant face of the item. If there is no upper left corner, place the IMS label either to the extreme left (See Example L of Figure C.3.5.3-3), or at the top of the dominant face.

2) Name Label

    a) If the dominant face of the item is populated with controls, the name label should be placed immediately to the right, or below the IMS label. If the dominant face is blank (such as a binder or stowage bag, as in Example B of Figure C.3.5.3-3), then the name label should be placed in the center of the face.

    b) Small Items - In the case of very small equipment items, an IMS label with the equipment's name in the text portion above the bar code is sufficient to satisfy both the IMS and Name label requirements.

E. Control Panel Labels

    1) Positions - Labels must be centered above connectors, switches, LEDs, displays, controls, etc. Labels may be placed in other locations when they cannot dimensionally fit in the required location, or if they would be obstructed by items like cables and hoses, or to preclude misassociation with adjacent items.

    2) Size – Labels for controls on a panel should be smaller than the name label for the panel, and should be between 10 and 20 point font. Different levels of controls should be graduated in size. For example, grouping label titles should be larger than the labels for the controls within them. Similar levels of controls should be the same size. See Figure C.3.5.3-2 for examples.

F. Part Number and Serial Number Labels – Part Number and Serial Number labels should be placed together for ease of identification. The Part Number label should be arranged to the left or above the Serial Number label. P/N and S/N, which are the standard OpNom representations of Part Number and Serial Number, respectively, should be used.

G. Orientation – All markings and labels must be oriented with respect to the local worksite plane so that they read from left to right. Vertical orientation, with letters arranged vertically if the text is short (e.g. DATA J3), or rotating the label 90 degrees when the text is long (e.g. PAYLOAD ELECTRONICS MODULE), is permissible when the marking or label does not fit in the required orientation.

H. Visibility – Labels must be placed on equipment so that they are visible when the equipment is used or accessed. Markings should be located such that they are perpendicular to the operator's normal line of sight whenever feasible and should not be less than 45 degrees from the line of sight.

I. Overhead Panels – On overhead panels, markings and labeling must be oriented such that they appear upright when observed from local vertical.

J. Association Errors – The arrangement of markings on panels should protect against errors of association of one marking or set of markings with adjacent ones.

NOT TO SCALE

IMS Label for Rack

Rack Name

IMS Label for Sub-Rack

Sub-Rack Name

Sub-Rack Location Code (inside seat track)

Right Seat Track

Left Seat Track (rotated)

Black Letters On White Background

A1
B1
C1

Access Panel ID labels (see C.3.5.4.2.3.B)

RIC is an ORU integrated into the back of the rack at Location Code E3

E3
E1
F1
G1
H1
J1

SRF C3-L   SRF C1-L

RIC

Specific Stowage Drawer (has name)

Stowage Drawer Labels (See Figure C.3.5.7-1)

Generic Stowage Drawer (no name)

SCIENCE RESEARCH FACILITY (SRF)
LEFT COMMAND AND CONTROL PANEL (LCCP) See Figure C.3.5.3-2
RIGHT COMMAND AND CONTROL PANEL (RCCP) (see Figure C.3.5.3-2)
MICROBIOLOGY FACILITY (MF) INCUBATOR UNIT
BEHAVIOR OF RESTRAINED MICROBES (BORM)
MF CRYO CHAMBER
WORKSTATION (WS)
MF CENTRIFUGE
MF MICROSCOPE
ULTRASOUND (US)
METABOLIC GAS ANALYZER (MGA)
RESEARCH ON SPACE SOILS (ROSS)
SPACE AGRICULTURE (SA)
DNA CURES TO ILLNESSES (DCTI)
NON-ANTIBIOTIC CURES TO INFECTIONS (NACTI)
BEE COLONY IN SPACE (BCIS)
PLANT EXP STOWAGE DRAWER
AQUATIC HABITAT

Rack IMS Label - Located on the top left corner of the rack.

Rack Name Label - Located to the right of the Rack IMS Label. Must be spelled out (48 point font minimum), with acronym following in parentheses. All subordinate equipment may then use the acronym.

Subrack IMS Label - Located on the top left corner of the subrack drawer.

Subrack Name Label - Located to the right of the Subrack IMS Label. Must be spelled out (between 28-36 point font), with acronym following in parentheses. All subordinate equipment may then use the acronym.
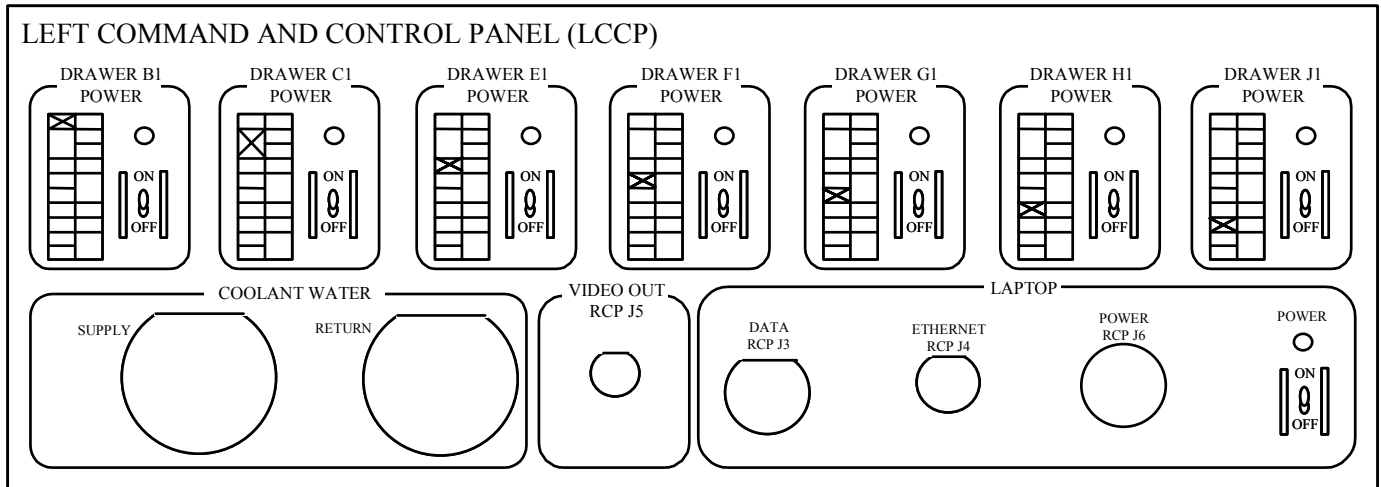
Subrack Location Codes - Located on the inside of the seat track. Letters A thru N, excluding I (18 point font). Letter/number pairs must be placed at intervals equal to the individual rack's smallest drawer unit (e.g. 4 PU (7 inches) for U.S. payloads, different for IP racks).

Note: In above figure, MF is a sub-facility within SRF comprised of 4 subracks (B2 through E2). The name is spelled out on the first subrack. The acronym is then used on subsequent subracks.

FIGURE C.3.5.3-1 RACK LABEL PLACEMENT

NOT TO SCALE

This panel is at the "A1" position in Figure C.3.5.3-1:

LEFT COMMAND AND CONTROL PANEL (LCCP)

DRAWER B1 POWER	DRAWER C1 POWER	DRAWER E1 POWER	DRAWER F1 POWER	DRAWER G1 POWER	DRAWER H1 POWER	DRAWER J1 POWER

COOLANT WATER

SUPPLY   RETURN

VIDEO OUT RCP J5

LAPTOP

DATA RCP J3   ETHERNET RCP J4   POWER RCP J6   POWER

ON
OFF

This panel is at the "A2" position in Figure C.3.5.3-1:

RIGHT COMMAND AND CONTROL PANEL (RCCP)

DRAWER B2 POWER	DRAWER C2 POWER	DRAWER D2 POWER	DRAWER E2 POWER	DRAWER F2 POWER	DRAWER H2 POWER	DRAWER J2 POWER

PAYLOAD

DATA RCP J2   POWER RCP J1   POWER

RECORDER

DATA J10   POWER J11   POWER

SMOKE INDICATION

RACK POWER
LAB/CAM
(pre-upgrade)
ON
OFF

ON
OFF
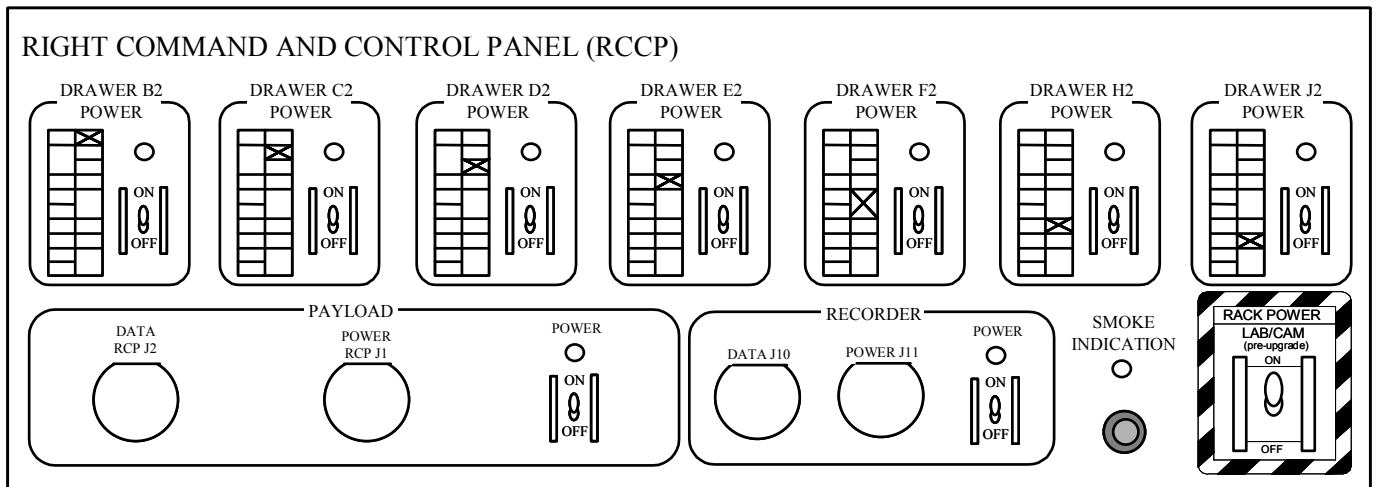
FIGURE C.3.5.3-2 CONTROL PANEL LABELING

IMS label

Identifying label

IMS label text (if used) and name label should match (except for case)

SRF Recorder
XXXXXXX

SRF RECORDER

dominant face with controls

ORU Example

Part Number/Serial Number Label(s)

P/N XXX-XX
S/N XXX-XX

Placement shown as example only.

Example B

XXXXXXX

SRF LOG BOOK

P/N XXX-XX
S/N XXX-XX

Ziploc Bag Example

(away from ziploc strip)

XXXXXXX

WIDGET W

Small Example

Widget S
XXXXXXX

Text is mixed case on IMS labels, but upper case on all others

IMS label with text containing item name is sufficient for small items

Example L

XXXXXXX

TUBE X

Note: These are guidelines for standardization purposes. IPLAT recognizes that there may be many unique cases which will not fit these examples.

FIGURE C.3.5.3-3 MISCELLANEOUS LABEL PLACEMENT GUIDELINES

C.3.5.4   EQUIPMENT LABELING

C.3.5.4.1   EQUIPMENT INDENTIFICATION

A. All items on a payload must be identified with a label, including, but not limited to: displays, controls, switches, connectors, LEDs, containers, vents, etc., such that these items can be clearly referenced in crew procedures. Only those items whose use is obvious to the crew (e.g., food table, windows, etc.) are exempt from this instruction. The font size for these labels must be smaller than the main label naming the payload.

B. Containers must be labeled to identify their contents.

C. Loose equipment must be marked with nomenclature that describes the function of the item and its pertinent interfaces.

D. Multi–quantity Items

(1) Multi–quantity items that require individual distinction but are not serialized must be individually numbered. Controls level items should be logically numbered/lettered left to right or top to bottom in descending order (e.g. "DRIVE A", "DRIVE B", "DRIVE C").

(2) Serial Numbers – Multi–quantity items that are serialized should display the serial number as part of the identification.

(3) Containers containing multiple quantities of the same item should use a number in parentheses, after the name, to indicate the quantity (i.e. "TEST TUBES (4)", indicates there are four test tubes in the container).

E. Logos – If organizational or commercial logo(s) are used, they must not be distracting to the crew while operating the payload.   For front panels, the size of a logo should be smaller than the main name label.

C.3.5.4.2 EQUIPMENT CODING

C.3.5.4.2.1 CABLE AND HOSE LABELING

A. Crew Interface Cables and Hoses Definition – Electrical cables and hoses *which are intended to be interfaced with by the crew* for nominal operations (e.g. experiment operations), planned maintenance (e.g. ORU replacement), or are designed to have a crew interface in the event of a contingency situation, are considered "Crew Interface Cables and Hoses", and are subject to the format requirements below.

B. Crew Interface Cables and Hoses must be labeled to indicate the equipment to which they belong and the connectors to which they mate.

(1) Electrical Cable End Plugs and Corresponding Electrical Connector Ports

a) The cable end plug must be designated with a "P" (e.g. P1), regardless of gender.

b) The connector port on the hardware must be designated with a "J", regardless of gender, and should be preceded by a descriptive name (e.g. DATA J1 or POWER J2).

c) The plug number and receptacle number for a mating pair should be identical (e.g. P1 mates with J1), except when not possible because a cable is generic.

(2) Cable and Hose Label General Characteristics

    a) Font Size - The font size of the text on these labels should be 12 point preferred, or 10 point minimum.

    b) Text/Background Color - The text should be black on a white background.

    c) Abbreviations - When long names would result in an unreasonably large label, text can be abbreviated.

    d) Continuation Lines For Long Names – Long names are discouraged, but if necessary, additional lines can be added to the cable/hose identification and ends labels described below.

(3) Cable and Hose Identifying Labels

    a) Cables and hoses must contain a main identifying label with the information below. This label must be placed at the mid-length position of the cable/hose, or at intervals not to exceed 2 meters for long utility lines. See Figure C.3.5.4.2.1-1 for examples.

        - The name of the cable/hose. For a hose, if the pressure is known and constant, it should be indicated in parentheses after the name (e.g. psi). The flow direction should be indicated with an arrow below the name if the hose ends are not interchangeable.

        - The Part Number of the cable or hose

        - The Serial Number of the cable or hose (if applicable)

(4) Cable and Hose IMS Labels – A cable/hose must contain one (and only one) IMS label. It must be placed to the left of the main identifying label, at the mid-length position, as shown in Figure C.3.5.4.2.1-1. If the cable/hose requires multiple main identifying labels spaced at 2 meter intervals per #3 above, the IMS label should be placed at the center of the line.
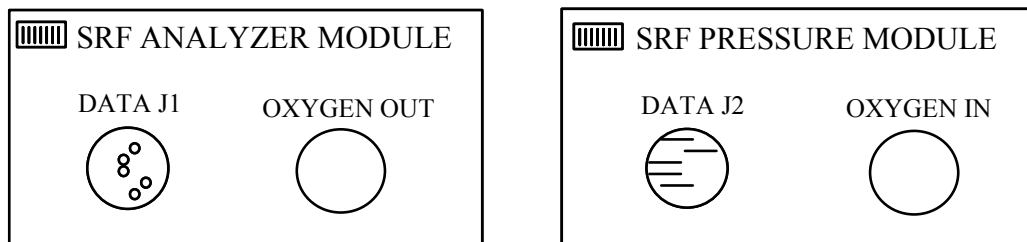
(5) Cable and Hose End Labels - Labels at the terminal ends of cables/hoses must contain the information below. Vertical order, center justified, is the preferred arrangement. When the circumference of the cable/hose is too small to accommodate a label that wraps around the line with text arranged vertically, a flag style label should be used. For cases where wear and tear of such flags is a concern (i.e. through frequent use), a horizontal

arrangement of the information is allowed as long as the text is short. See Figure C.3.5.4.2.1–1 for cable/hose label examples.
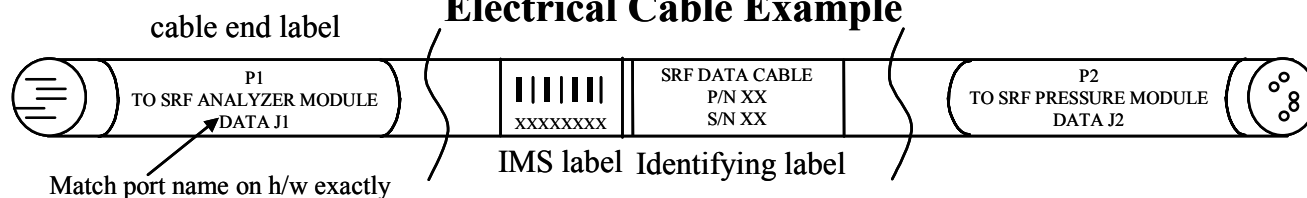
- First Line: The name of this end of the cable/hose (e.g. for cables, P1). For a hose, if the end does not have a specific identifier, this line may be left off. If the hose end needs to have a unique identifier, do not use a "P" number ("P"s are reserved for cables).

- Second Line: The word "TO" followed by the name of the piece of equipment to which this end of the cable/hose mates with. If this end can interface to multiple connector ports (e.g. generic cables), this line may be left off.

- Third Line: The exact name of the receptacle on the hardware that this end of the cable/hose mates with (e.g. DATA J1 or OXYGEN OUT).   If this end can interface to multiple connector ports (i.e. generic cables), this line may be left off.

(6) Hose Hazard Labels – Hoses must have standard hazard class decals indicating the appropriate hazard level for the substance transported through the hose. This label must be placed to the right of the identifying label.
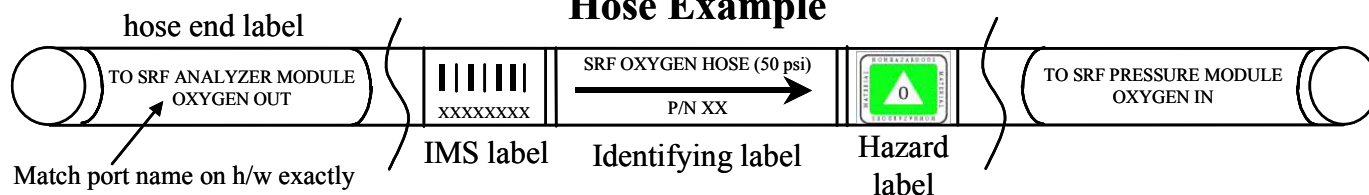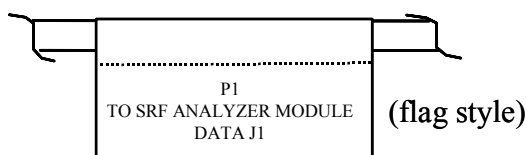
SCIENCE RESEARCH FACILITY (SRF)

NOT TO
SCALE

SRF ANALYZER MODULE

DATA J1   OXYGEN OUT

SRF PRESSURE MODULE

DATA J2   OXYGEN IN

Electrical Cable Example

cable end label

P1
TO SRF ANALYZER MODULE
DATA J1

XXXXXXXX

SRF DATA CABLE
P/N XX
S/N XX

P2
TO SRF PRESSURE MODULE
DATA J2

Match port name on h/w exactly

IMS label Identifying label

Hose Example

hose end label

TO SRF ANALYZER MODULE
OXYGEN OUT

XXXXXXXX

SRF OXYGEN HOSE (50 psi)
P/N XX

NONHAZARDOUS
0

TO SRF PRESSURE MODULE
OXYGEN IN

Match port name on h/w exactly

IMS label   Identifying label   Hazard
label

Also acceptable:

P1
TO SRF ANALYZER MODULE
DATA J1

(flag style)

Or:

P3 TO RCDR DATA J3

(band style, with text
horizontal if it is short)

Notes:

Electrical cables/ports: "P" designates cable end plugs and "J" designates
receptacles on hardware regardless of gender (pins/sockets).

Hose End Labels: The first line of the end label may be left off (as shown above) if
the hose end does not have a specific identifier. In this case, only the second and
third lines are needed. If hose ends must be identified, do not use a "P" number.

Hose Identifying Labels: Pressure should be indicated only if it is constant. Flow
direction should be shown if the hose ends are not interchangeable.

FIGURE C.3.5.4.2.1-1 CABLE AND HOSE LABELING

C.3.5.4.2.2   COLOR CODING

A. Red must only be used to mark emergency use items. Yellow must only be used to mark Caution and Warning items. See section C.3.5.9 for Caution & Warning labeling requirements.

B. Hazard Labels – Hazard labels have their own, unique coding scheme, of which color is one factor. See Section C.3.5.9.I for instructions.

C. Identification/Connectivity – Color coding used for component identification or to denote connectivity relationships must combine color with nomenclature (i.e. hardware name and the payload it belongs to, simple number, part number, etc.) such that when those components are referred to within procedures, it is clear which components the procedures are referring to. The only color restriction is listed in paragraph A (red and yellow cannot be used).

D. Color Difference

   (1) Only one hue within a color category (e.g., blues, greens) should be used on the decals or placards within the same integrated rack.

   (2) That color must always be associated with a single meaning within the same system or integrated rack.

E. Number of Colors – No more than 9 colors, including white and black, must be used in a coding system.

F. Markings/Background Color – Markings and background colors on labels must have sufficient contrast such that the labels are readable in ambient ISS lighting conditions. Labels should adhere to the accepted combinations of markings and background color listed below:

Markings	Background
Black	White
Black	Yellow
Black	Silver (metalphoto labels)
White	Black
White	Red
White	Grey
Yellow	Blue

Red   White

Blue   Yellow

C.3.5.4.2.3   LOCATION AND ORIENTATION CODING

A. Subrack Location Codes:

1) At the Rack Level - Subrack location codes must be placed along the inside surface of the seat track at intervals equal to the individual rack's smallest drawer unit (e.g: 4 PU (7 inches) for U.S. payloads, different for IP racks), as shown in Figure C.3.5.3-1. Each letter/number pair must be 18 point font and placed at the top of the particular drawer interval. Locations other than the inside of the seat track are permissible only if there is a permanent obstruction that would cover the labels.

2) For Control Panels That Control Multiple Subracks – Each subrack's controls must be mapped to its location using the letter/number code (e.g. "A1", "A2", "B1", "B2", etc.), and a graphic (matrix with appropriate box checked) showing the individual locker's location in the rack. See Figure C.3.5.3-2 for examples.

B. Access Panels - maintenance access panels must be labeled to assist the crew in locating the panel for maintenance activities.

1) Access panel identification labels should be located in the upper left corner position on the panel with respect to the local vertical orientation.

2) Access panel identification labels for access panels on the side or back of a rack must be labeled as in Figure C.3.5.3-1 and include:

   a) The acronym for the rack (e.g. "SRF").
   b) Its height location using the subrack location code (e.g. "C3") .
   c) Its left, right, or back location on the rack preceded by a hyphen (e.g. "-L" for left, "-R" for right, "-B" for back).

   For example, a completed access panel label might be "SRF C3-L" or "SRF C3-R".

C. Alignment Marks/Interface Identification

1) Alignment Marks – Alignment marks or other orientation markings must be used to aid the crew with the installation/mating of equipment when the hardware requires a specific orientation.

2) Visibility – Alignment marks, arrows, or other labels showing required orientation must be visible during alignment and attachment.

3) Tethered Equipment – Interface identification should not be used for movable items tethered to a mating part (e.g., dust cap for an electrical connector, hinged lid for a stowage container).

C.3.5.5 DELETED

C.3.5.6   OPERATING INSTRUCTION LABELS

Operating instruction labels are hardware labels (affixed to hardware) that contain procedural steps. The procedural text should be coordinated with the PODF prior to final IPLAT approval and conform to ODF standards as documented in ODF Standards, SSP 50253. See Figure C.3.5.6-1 for an example.

A. Location – Equipment operating instructions should be located on or adjacent to equipment.

B. Equipment Name – The instructions should have the title of the equipment to be operated centered above the text.

C. Grouping – Instructions should be grouped and titled by category (e.g., installation, removal, activation, calibration, etc.).

D. Title Selection – The titles of instructional text for equipment, displays, controls, switch positions, connectors, etc., must be in upper case letters only and bold.

(1) Title nomenclature must be consistent with procedural handbooks and checklists.

E. Instructional Text – Instructional text below titles must use upper and lower case letters. Direct references to hardware items should be in upper case so they match the hardware labels.

F. Required Tools – Instruction for removal of stowage items should list any tools required prior to the instructional text.

(1) When tools are required to remove stowage items, markings should be used for the location of the fasteners to be removed.
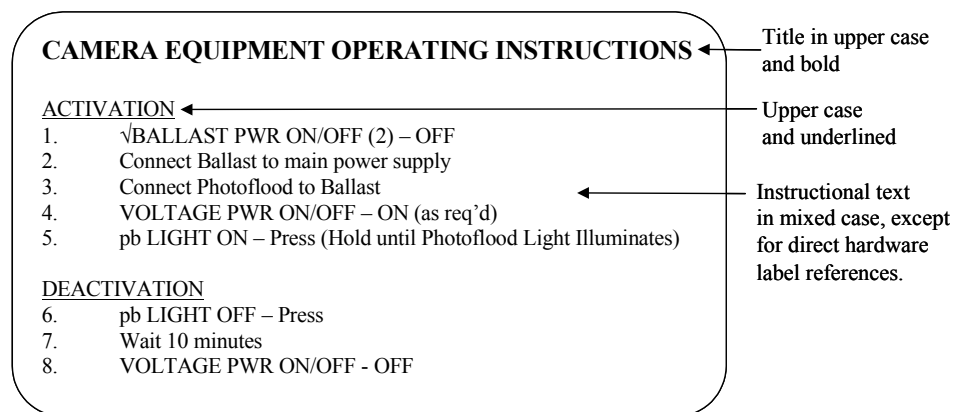

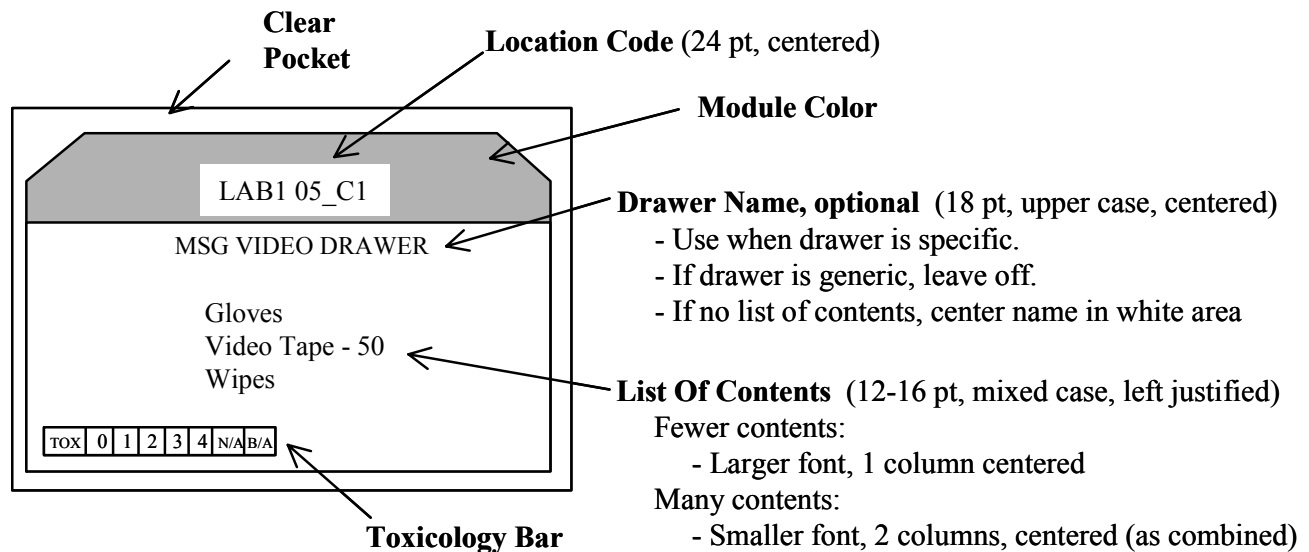**FIGURE C.3.5.6-1 OPERATING INSTRUCTION LABEL EXAMPLE**

C.3.5.7   STOWAGE CONTAINER LABELING

This section applies to stowage containers provided by the payload, located within the payload, not in general ISS stowage containers.
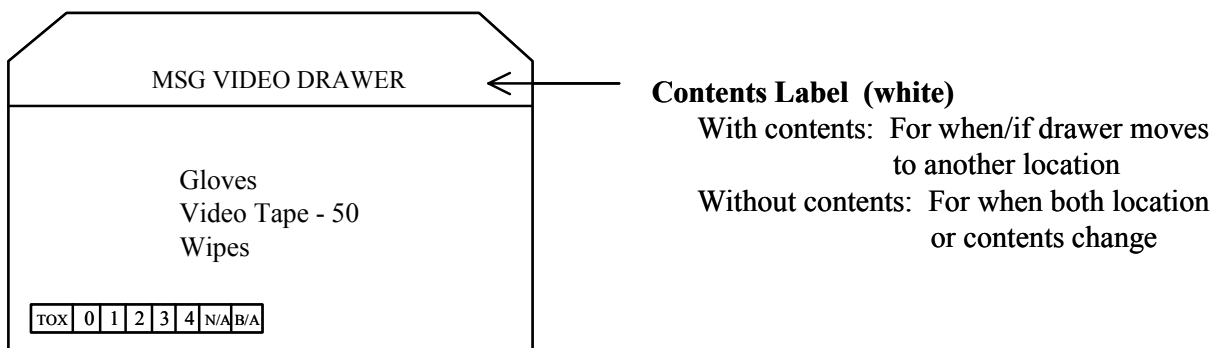
A. Each stowage container must display the contents on its front surface visible to the crewmember.

   For drawer, box, or bag style stowage containers that are mounted as subracks as in Figure C.3.5.3-1, the following requirements apply:
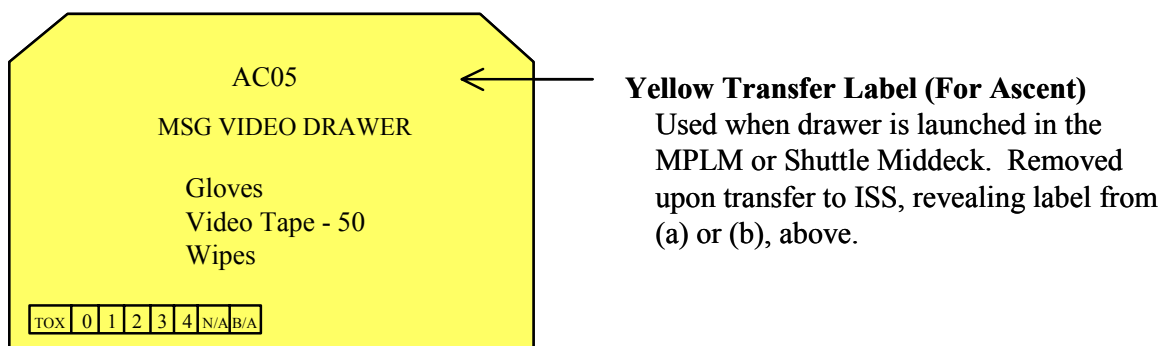
   (1) The contents label should be as shown in Figure C.3.5.7-1a when the location is known and fixed. The contents label should be as shown in Figure C.3.5.7-1b when the location is not known or is variable.

   (2) If the drawer/box/bag is being launched individually in the MPLM or the Space Shuttle Middeck, then the drawer must have the ascent label as shown in Figure C.3.5.7-1c, in the front of the pocket. This label is then removed upon transfer to ISS, revealing the label in Figure C.3.5.7-1a or C.3.5.7-1b.

B. Provisions should be made to permit in-flight revisions to or replacement of stowage labels on all stowage containers.

C. Subdivided Containers:

   (1) If a stowage container is subdivided internally into smaller closed containers, the sub-containers must carry a list of contents.

   (2) If the available marking space on a sub-container is insufficient to display the complete content titles, a contents list must be displayed elsewhere and clearly identified as belonging to the sub-container.

   (3) The specific contents of each sub-container must be listed on the front surface of its container or near it.

D. Individual–Crew Items – Items allocated to a specific crewmember should be identified on the listing with the user's title, name, or other coding technique.

E. Tool/Accessory Kit Labeling – Containers with designated locations for placement of equipment set (e.g., socket wrenches in a tool kit) should have each location identified with the title of the item stowed.

Clear Pocket

Location Code (24 pt, centered)

Module Color

LAB1 05_C1

MSG VIDEO DRAWER

Drawer Name, optional (18 pt, upper case, centered)
- Use when drawer is specific.
- If drawer is generic, leave off.
- If no list of contents, center name in white area

Gloves
Video Tape - 50
Wipes

List Of Contents (12-16 pt, mixed case, left justified)
Fewer contents:
- Larger font, 1 column centered
Many contents:
- Smaller font, 2 columns, centered (as combined)

TOX | 0 | 1 | 2 | 3 | 4 | N/A | B/A

Toxicology Bar

a) Standard Drawer Title/Contents Label - With Location Information

MSG VIDEO DRAWER

Contents Label (white)
With contents: For when/if drawer moves
to another location
Without contents: For when both location
or contents change

Gloves
Video Tape - 50
Wipes

TOX | 0 | 1 | 2 | 3 | 4 | N/A | B/A

b) Standard Drawer Contents Label - Without Location Information

AC05

MSG VIDEO DRAWER

Yellow Transfer Label (For Ascent)
Used when drawer is launched in the
MPLM or Shuttle Middeck. Removed
upon transfer to ISS, revealing label from
(a) or (b), above.

Gloves
Video Tape - 50
Wipes

TOX | 0 | 1 | 2 | 3 | 4 | N/A | B/A

c) Ascent Drawer Contents Label

Note: IPLAT must review the proposed label. The PD can then order this label from the
Decal Design & Production Facility (DDPF). Reference Drawing #SEG32106109,
"Crew Transfer Bag Standard Label".

FIGURE C.3.5.7-1 STANDARD PAYLOAD STOWAGE DRAWER LABELS

C.3.5.8   GROUPED EQUIPMENT ITEMS

A. Functional groups of three or more equipment items (i.e. displays, controls, switch positions, connectors, LEDS, etc.) must be identified (e.g., by common color, by boundary lines). Functional groups of equipment items are all associated or connected with a common system or purpose. (e.g., CABIN AIR, FURNACE A, EXPERIMENT "M", PANEL LIGHTING). Two functionally related items should be grouped when such grouping provides clarification of purpose and/or distinquishes them from surrounding items. See Figure C.3.5.8–1 for grouping label examples.

B. Labels must be located above the functional groups they identify.

C. When a line is used to enclose a functional group and define its boundaries, the labels must be centered at the top of the group, in a break in the line. When it is not possible to center the text at the top, the text may be placed elsewhere along the perimeter of the boundary line, but local vertical orientation or the text must be maintained.

   (1) The width of the line must not be greater than the stroke width of the letters.

   (2) The line must form an enclosed rectangle, or box, with rounded corners. Deviations from the rectangular shape are allowed when dimensional restrictions preclude a perfect rectangle.

D. When displays and controls are used together in adjustments or activation tasks, visible labels or markings must indicate their functional relationships.
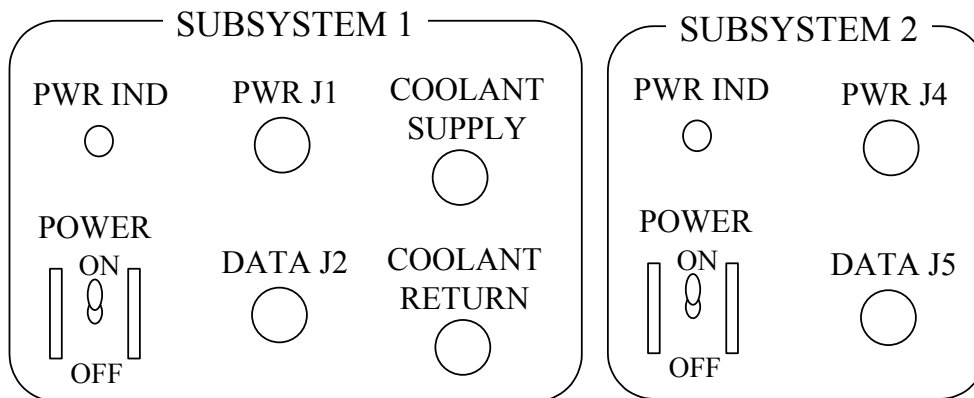

FIGURE C.3.5.8–1 GROUPING LABEL EXAMPLES

C.3.5.9   CAUTION AND WARNING LABELS

Caution and warning labels are required for indicating potentially undesirable conditions. See Figure C.3.5.9-1 for examples.

A. Caution and warning labels must be standardized between and within systems.

B. Caution and warning labels must be distinct from one another.

C. Caution and warning labels must identify the type of hazard and the action that would prevent its occurrence.

D. The caution and warning markings must be located in a visible area.

E. Emergency-Use Label Specifications

   (1) Labels on emergency-use items (e.g., repair kits, emergency lighting, fire extinguisher, etc.) must be surrounded by diagonal red and white stripes either on the item or adjacent to it.

   (2) The emergency type warning stripes must be alternate red and white.

   (3) The red and white stripes should be of equal width.

   (4) There must be no fewer than four red stripes and three white stripes.

   (5) The striping must be applied at a 45 degree angle rotated clockwise from the vertical.

   (6) The striping must begin and end with a red stripe.

   (7) The text must be white letters on the red background or red letters on a white background.

   (8) For items located within a storage container, the diagonal striping must be applied to the door of the container and the titles of the emergency items must be included on the marking.

F. Caution And Warning Label Specifications

   (1) Caution/warning decals and placards must be surrounded by diagonal yellow and black stripes.

   (2) The caution/warning type stripes must be alternate yellow and black.

   (3) The yellow and black stripes should be of equal width.

(4) There must be no fewer than four yellow stripes and three black stripes.

(5) The striping must be applied at a 45 degree angle rotated clockwise from the vertical.

(6) The striping must begin and end with a yellow stripe.

(7) The text must be black letters on the yellow background.

G. Switches and Buttons

(1) The striping around a switch or button should not be wider than 25mm (1 in.) or narrower than 3 mm (0.125 in.).

(2) If one side of a switch or button has less than 3 mm (0.125 in.) space, no striping should be applied to that side.

H. Deleted.

I. Hazard Labels

(1) Chemicals – The standard hazard class decals must be used to identify the proper hazard class of payload chemicals (i.e. chemicals in solid, liquid, or gaseous states), as deemed by the payload's toxicology representative.   The developer may obtain these decals from JSC 27260, Decal Process Document and Catalog, or must produce identical labels.   See NSTS 07700, Volume 14, Appendix 9, Section 5.6.3 for hazard class definitions.

(2) Other hazards - When biological, radiation, sharps, battery, or other hazards are identified by safety personnel, the appropriate standard label (if available) must be applied in a prominent location. The developer may obtain these decals from JSC 27260, Decal Process Document and Catalog, or must produce identical labels.

Emergency Label Example

Caution/Warning Label Example

Toxic Hazard Label Examples

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FIGURE C.3.5.9-1 CAUTION AND WARNING LABEL EXAMPLES

C.3.5.10   ALPHANUMERIC

C.3.5.10.1   FONT STYLE

A. The font style used on decals, placards, and labels must be Helvetica or Futura demibold. If there are fit problems:

The use of condensed type (Helvetica Condensed) or abbreviations is the preferred method of solving line length.

> or

For engraved markings which are not able to exactly match the above required font, the engraved marking should match the Helvetica font as nearly as possible.

> Note: Helvetica is the preferred font.

B. Stenciled Characters – Stencil–type characters should not be used on display/control panels or other equipment.

C.3.5.10.2   PUNCTUATION

A. Periods & Commas – Periods (.) and commas (,) should not be used in equipment labels, except to preclude misinterpretation.

B. Hyphens – Hyphens (–) should not be used in equipment labels, except in part and serial numbers and to preclude misinterpretation.

C. Parentheses and Ampersands – In general, parentheses and ampersands should not be used on payload equipment. Parentheses may be used to enclose acronyms after spelled out names (See Section C.3.5.3) and to designate multiple quantities of an item (See Section C.3.5.4.1.D.3). Ampersands may be used where the substitution of slashes (/) would remove or distort the intended meaning (i.e. PUSH & HOLD vs. PUSH/HOLD).

D. Slashes – The slash (/) may be used in place of the words "and" and "or" and may be used to indicate multiple functions.

C.3.5.10.3   SPECIAL CHARACTER

A. Subscript and Superscript Size – Subscripts and superscripts should be 0.6 to 0.7 times the height of associated characters.

B. Subscripts – Numeric subscripts and upper case letter subscripts should be centered on the baseline of associated characters.

C. Lower Case Letter Subscripts –The base of lower case letters and the ovals of g, p, q, etc., should be at the same level as the base of adjacent capital letters.

D. Degree Symbol – The degree symbol should be centered on an imaginary line extended from the top of the F or C symbols.

E. Pound or Number Symbol (#) – The pound or number symbol should be centered on an imaginary line extended from the top of the associated numerals and placed two stroke widths away from them.

C.3.5.10.4   CHARACTER HEIGHT

A. Character Height – Character height depends on viewing distance and luminance level. At a viewing distance of 710 mm (28 in.), the height of letters and numerals should be within the range of values given in Table C.3.6.10.4–1.

B. Variable Distance – For a distance (D) other than 710 mm (28 in.), multiply the values in Table C.3.5.10.4–1 by D/710 mm (D/28 in.) to obtain the appropriate character height.

TABLE C.3.5.10.4–1 CHARACTER HEIGHT – 710 mm (28 in) VIEWING DISTANCE

Markings	Character Height	
	3.5 cd/m^2 (1ft-L) or below	Above 3.5 cd/m^2 (1ft-L)
For critical markings, with position variable (e.g., numerals on counters and settable or moving scales)	5-8 mm (0.20-0.31 in.)	3-5 mm (0.12-0.20 in.)
For critical markings, with positionfixed (e.g., numerals on fixed scales, controls, and switch markings, or emergency instructions)	4-8 mm (0.16-0.31 in.)	2.5-5 mm (0.10-0.20 in.)
For noncritical markings (e.g., identification labels, routine instructions, or markings required only for familiarization)	1.3-5 mm (0.05-0.20 in.)	1.3-5 mm (0.05-0.20 in.)

C. Size Categories – Characters used in hierarchical labeling (e.g. rack name, subrack name, controls groupings, port names, etc.) should be graduated in size. There should be at least a 25 percent difference in the character height between each of these categories.

D. Space Limitations – The use of the same size letters and numerals for all categories on a label is acceptable for solving space limitation and clarity problems. The height of lettering and numerals should be not less than 3 mm (0.12 in.).

C.3.5.10.5   CHARACTER WIDTH

A. Letters – The width of letters should be 0.6 of the height, except for the letter "I," which should be one stroke in width, the letters "J" and "L", which should be 0.5 of the height, the letter "M", which should be 0.7 of the height, and the letter "W," which should be 0.8 of the height.

B. Numerals – The width of numerals should be 0.6 of the height, except for the numeral "4", which should be one stroke width wider and the numeral "1", which should be one stroke in width.

C. Wide Characters – When wider characters are used on a curved surface, the basic height–to–width ratio should be increased to 1:1.

C.3.5.10.6   STROKE WIDTH

A. Height–to–Stroke Ratio – Marking letters and numerals should have a height–to–stroke ratio of 5:1 to 8:1.

B. Transillumination Background – Opaque markings on a transilluminated lighted background should have a height–to–stroke ratio of 5:1 to 6:1.

C. Transilluminated Markings – Transilluminated markings on a dark background or markings used on integrally lighted instruments should have a height–to–stroke ratio of 7:1 to 8:1.

D. General Purpose Illumination – Characters used on display panels and equipment when viewed under general purpose flood lighting or normal display conditions as specified in Table 3.12.3.4–2 should have a height–to–stroke ratio of 6:1 to 7:1.

C.3.5.10.7   CHARACTER MEASUREMENT

A. Measurement – All letters and numeral measurement should be made from the outside edges of the stroke lines for other than machine engraving on opaque surfaces.

B. Engravings – For all mechanical engraving on opaque surfaces, the dimensions controlling the size of letters and numerals should be measured from centerline to centerline of the stroke.

C.3.5.10.8   SPACE

A. Character Spacing – The spacing between letters within words and between digits in a multi–digit number should be the equivalent of one stroke width between two straight–sided letters such as H and l. (This instruction intended to accommodate the normal commercial typographical practice of spacing letters to achieve a, consistent visual continuity. This permits close spacing of open letters such as C and T to avoid large apparent gaps.)

B. Word Spacing – The spacing between words should be the equivalent of the letter W between two straight–sided letters such as N and F.

C. Line Spacing

   (1) The spacing between lines of related text should be 0.5 of upper case letter height.

   (2) Spacing between headings and text should be 0.6 to 1.0 of upper case letter height.

C.3.5.11   BAR CODING

PDs will coordinate with NASA/JSC organization OC for Inventory Management System (IMS) label registration.

A. Racks, subracks, stowage trays, loose equipment, consumables, and ORUs must have an inventory management label in accordance with SSP 50007. IMS labels, or their placeholders, must be present on engineering drawings. If the PD orders their IMS labels from the DDPF, the Decal Catalog decal part number should be included in a note on the engineering drawing.

B. Deleted.

C. Deleted.

C.3.6   SCALE MARKING

A. Accuracy

   (1) The precision of scale marking should be equal to or less than the precision of the input signal.

   (2) In general, scales that are to be read quantitatively to the nearest graduation mark should be designed so that interpolation between graduation marks is not necessary. Interpolation should be limited to one half the distance between minor graduation marks.

(3) Scales should have a zero reference.

(4) If precise measurements are needed, scale graduation marks should be marked clearly to allow for unambiguous measurements.

B. Interval Values

(1) The graduation intervals should progress by 1, 5, or 2 units of decimal multiples thereof, in that order of preference.

(2) The number of graduation marks between numbered graduation marks should not exceed 9.

C. Scale Markings (High Luminance – above 1 ft–L)

(1) The minimum width of major, intermediate, and minor marks should be 0.32 mm (0.0125 in.)

(2) The length of major, intermediate, and minor graduation marks should be at least 5.6 mm, 4.1 mm, and 2.5 mm (0.22, 0.16, and 0.09 in.), respectively.

(3) The minimum distance between major graduation marks should be 13 mm (0.5 in.).

(4) Minor graduation marks may be spaced as close as 0.89 mm (0.035 in.), but the distance should be at least twice the stroke width for white marks on black dial faces and at least one stroke width for black marks on white dial faces.

D. Scale Markings (Low Luminance – below 1 ft–L)

(1) The minimum width of a major graduation should be 0.89 mm (0.035 in.), the minimum width of an intermediate graduation should be 0.76 mm (0.030 in.), and the minimum width of a minor graduation should be 0.64 mm (0.025 in.).

(2) The length of major, intermediate, and minor graduation marks should be at least 5.6 mm, 4.1 mm, and 2.5 mm (0.22, 0.16, and 0.10 in.), respectively.

(3) The minimum distance between major graduation marks should be 16.5 mm (0.65 in.).

(4) Graduation marks should be spaced a minimum of 1.5 mm (0.06 in.) between centerlines.